

REMARKS

Applicants have amended the specification to reference the prior related issued patent. The Abstract of the Disclosure has been modified in accord with the Examiner's suggestion. The claims have been modified to more clearly point out and distinctly claim the subject matter of the invention and to differentiate the invention from the prior art. The duplicate page 20 should be removed from the original specification. A Terminal Disclaimer is enclosed to obviate the double patenting objection raised by the Examiner. In view of the foregoing and the following remarks, it is believed that the claims are in condition for review and allowance.

Briefly, the invention relates to a method for installation of a multi-level pier of compacted aggregate in a soil matrix. As an initial step, a hollow tube is placed in the ground by being driven therein or otherwise pushed or inserted into the soil matrix. The soil matrix within the hollow tube is then removed for example, by an auger. Subsequently, aggregate is placed in the core of the hollow tube. The hollow tube is then raised an incremental distance and also moved or vibrated in a manner which affects both longitudinal and lateral forces with respect to the hollow tube acting on the discharged aggregate. Optionally or additionally, a mechanical member may be placed or maintained within the hollow core of the hollow tube to effect additional lateral and longitudinal forces on the aggregate material which is discharged from the hollow tube as it is raised each incremental step. The effect of the longitudinal and lateral forces on the hollow tube and/or the mechanical member results in compaction of the aggregate and forcing of the aggregate laterally into the soil matrix. This process is repeated stepwise in order to form a pier in the soil matrix.

The Examiner relied upon two references in rejecting the initial claims. The first reference to Frankingnoul, U.S. Patent No. 1,764,948 discloses a tube (a) with rock or aggregate

(b) at the lower end of the tube and a layer of concrete (c) positioned over the rock or aggregate material (b). A sledge or hammer (d) is then utilized to drive the entire assembly downwardly into a soil matrix in the manner of a pile driver. The tube is then raised and the pile or hammer (d) is continued to be operated to drive the contents of the tube downwardly and outwardly. This is effected by adding additional layers of concrete to ultimately form a multilayer pile of concrete in the soil.

A secondary reference, U.S. Patent No. 4,657,441 was relied upon for its showing of the lower end of a tube which is driven into the soil for oil drilling operations. The tube has a shaped lower end which is designed to compact the soil laterally and to loosen the soil in a manner such that when it moves upwardly through the hollow core of the tube, it can ultimately be removed.

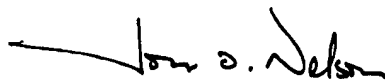
Applicants respectfully suggest that the principal prior art reference to Frankignoul does not teach the concept of first positioning the tube in the soil matrix, then subsequently removing the soil matrix from the hollow core of the hollow tube followed by incremental raising of the hollow tube and utilizing the tube as it is raised incrementally to provide both lateral and longitudinal forces on aggregate material as that aggregate material is discharged from the open end of the hollow tube. For example, Frankignoul does not remove the soil matrix from the hollow tube. Rather, Frankignoul merely drives its arrangement of the combined tube and the plug of aggregate material at one end of the tube into the soil. Further, Frankignoul does not teach the concept of both lateral and longitudinal displacement of the hollow tube in a manner which imparts longitudinal and lateral forces on the aggregate material discharged as the hollow tube is raised. In other words, in applicants' invention, the hollow tube is raised incrementally and vibrated both laterally and longitudinally to effect the compaction of the aggregate material.

Frankignoul merely removes the hollow tube from the soil and does not use it as a lateral and longitudinal compaction device.

Similarly, the Horvath patent does not provide such an arrangement to effect lateral and longitudinal compaction of lifts of material discharged from the end of the hollow tube as the tube is raised from its soil matrix environment.

In view of the foregoing, therefore, it is believed that the claims in their amended condition are distinct from the prior art. Reconsideration and passage of the claims to allowance is therefore earnestly solicited.

Respectfully submitted,



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